NITROAROMATICS
Summary of Screening Level Data for m-Nitrotoluene

CAS No. 99-08-1

Monocyclic Aromatic Amines and Nitroaromatics Panel
American Chemistry Council
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Member companies in the Monocyclic Aromatic Amines and Nitroaromatics Panel are Albemarle Corporation, Bayer Corporation, Buffalo Color Corporation, and First Chemical Corporation.

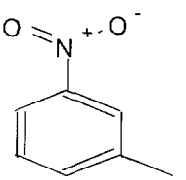
I. INTRODUCTION

The Monocyclic Aromatic Amines and Nitroaromatics Panel was organized under the American Chemistry Council to participate in the Environmental Protection Agency's High Production Volume (HPV) Challenge Program (the HPV program). The member companies are committed to making existing test data publicly available for products in these two categories and developing any additional screening level data needed on health and environmental effects, fate, and physiochemical properties.

In consideration of animal welfare concerns to minimize the use of animals in the testing of chemicals, the Panel has performed a thorough literature search for all published and unpublished data and has evaluated the adequacy of the data. This document summarizes the existing test data for m-nitrotoluene, a monocyclic nitroaromatic compound included in the HPV program. A IUCLID document has been prepared and is included for this chemical. This document references all the studies summarized below.

II. SUMMARY OF M-NITROTOLUENE DATA

Figure 1. m-Nitrotoluene
CAS number 99-08-1



Manufacturing, Use, and Exposure Information for m-Nitrotoluene

m-Nitrotoluene is used in organic synthesis, specifically in the synthesis of dyes, toluidines, nitrobenzoic acids, and explosives. Mixed nitrotoluene isomers are manufactured by the reaction of toluene with nitric acid, using a sulfuric acid catalyst. The meta isomer is separated by distillation. Because this chemical is used only as an intermediate, human and environmental exposure is limited. The potential for exposure occurs in the workplaces of the manufacturers and their customers. The ACGIH TLV® TWA exposure limit is 2 ppm (11 mg/m^3) with a skin notation. The OSHA PEL is 5 ppm (30 mg/m^3) with a skin notation, and the DFG MAK limit is also 5 ppm (28 mg/m^3) with a skin notation. The NIOSH IDLH (immediately dangerous to life and health) concentration is 200 ppm. The manufacturer uses and recommends both personal

protective equipment and engineering controls to limit exposure. If air concentrations are above 2 ppm and less than 50 ppm, a NIOSH approved full-face respirator with canisters or cartridges specifically approved for use with organic vapors is recommended as a minimum. If greater than 50 ppm, a self-contained breathing apparatus should be used. If the atmospheric concentration is unknown, a supplied air respirator is recommended. To prevent skin contact, use of supported neoprene gloves for routine work and butyl rubber gloves when there is a probability of liquid contact is recommended. A butyl rubber full body suit may be needed depending on exposure potential. To prevent eye contact, chemical goggles should be used. If splashing is possible, a full face shield is recommended.

Summary of Test Data

Test data is available for all HPV endpoints for m-nitrotoluene. Therefore, no testing is proposed. The data are reviewed below. The IUCLID document contains a summary of all available information on this chemical.

Physical and Chemical Properties

m-Nitrotoluene is a liquid at room temperature, and has a relative density of 1.157. The boiling point is 232°C at atmospheric pressure, and the reported vapor pressure ranges from 10 hPa at 89.7°C to 0.199 hPa at 20°C. It is considered moderately soluble in water. The log of the octanol-water partition coefficient is 2.45, which indicates a low potential for bioaccumulation. This low potential was confirmed in bioaccumulation studies in fish. These data are sufficient to describe the physical and chemical properties of this chemical for the purposes of the HPV program.

Fate

If released into water, biodegradation will be a major removal process. Evaporation from water will also be significant, as will photolysis in surface waters. m-Nitrotoluene is not readily biodegradable, but is inherently biodegradable. Adsorption to sediments is expected to be low. In air, reaction with hydroxyl radicals is expected to be negligible. In soils, adsorption is predicted to be low, and leaching is expected to be significant. Evaporation from dry soils is expected to be low. There is sufficient data for m-nitrotoluene to characterize its fate for the purposes of the HPV program.

Aquatic Toxicity

m-Nitrotoluene was harmful to fish (96-hr LC_{50}>10<100 mg/L) and harmful or toxic (48-hr LC_{50}>1<10 mg/L) to Daphnia. This chemical was also harmful to algae. The aquatic toxicity data are adequate for m-nitrotoluene for the purposes of the HPV program.

Mammalian Acute Toxicity

m-Nitrotoluene was found to be harmful in most studies by single oral doses, as the rat oral LD_{50}'s were >500 and <2000 mg/kg. It was not harmful by inhalation or by single dermal applications; no evidence of toxicity was found by these routes. No further acute toxicity testing is needed for the purposes of the HPV program.

Mammalian Repeated Exposure Toxicity

Oral toxicity studies in rats and mice ranging from two weeks to three months in duration have been completed on m-nitrotoluene. Both incorporation into diet and gavage were used to administer the test material. In rats, adverse effects on the blood such as increased methemoglobinemia, anemia, reticulocytosis, and spleen congestion were common at high doses. These effects are typical for nitroaromatic compounds. Other effects in rats included mild

effects on the liver, hyaline droplet nephropathy in males, and effects on the male and female reproductive systems. Mice had mild, reversible effects on the liver and lung and immunotoxicity; there was no evidence of reproductive effects. This chemical has been adequately tested for repeated exposure toxicity for the purposes of the HPV program.

Genetic Toxicity

Standard bacterial assays found no evidence of mutagenicity. In vitro cytogenetics assays in Chinese hamster ovary and lung cells were negative, but an assay using human lymphocytes was positive. Studies of unscheduled DNA synthesis in whole animals were negative. Genetic toxicity screening is adequate for m-nitrotoluene for the purposes of the HPV program.

Developmental and Reproductive Toxicity

A combined developmental and reproductive toxicity screening study was done in rats. Blood and spleen effects typical for nitroaromatic compounds were found in the parental animals, and less severe splenic toxicity was also found in the offspring at 3 months of age. There were no effects on fertility or any other reproductive parameters. This study is consistent with the results of the three month oral study in rats described above, as the dose used in this screening study was slightly lower than the doses responsible for reproductive toxicity in the three month study. This study is sufficient to characterize the developmental and reproductive toxicity of m-nitrotoluene for the purposes of the HPV program.